G.E.M.S.

Gym Equipment Monitoring System

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Abstract

The UC Rec Center has its workout equipment and machinery spread out between several rooms and areas which, coupled with its large volume of visitors, creates a unique wait queue problem. G.E.M.S. seeks to provide an innovative solution to this problem and help gym-goers save precious time. Our implementation uses motion-tracking ai to update our web interface in real-time.

Technology

YOLOv5 · HTML · CSS · JS · OpenCV · Python · MySQL

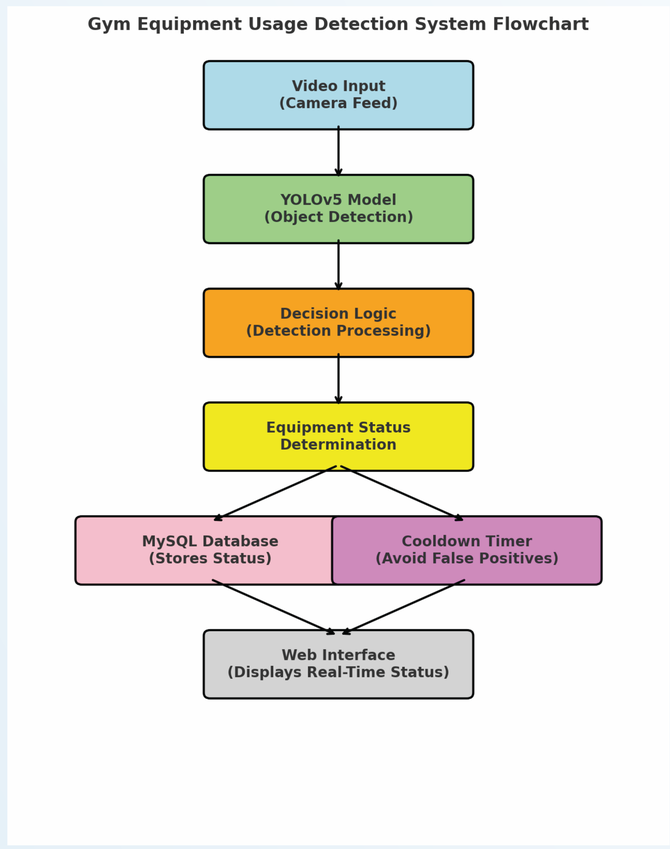
Goals

- Develop a system using machine learning for detecting equipment usage via camera feeds
- Optimize database efficiency for tracking historical usage data
- Provide real-time updates to a web interface for gym users that is both intuitive and user-friendly
- Deploy a scalable and maintainable system to show proof of concept

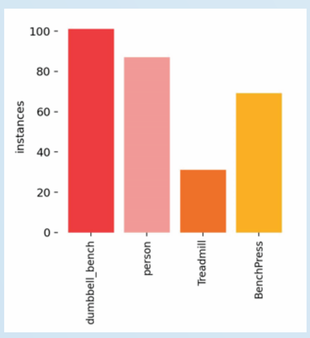
Challenges

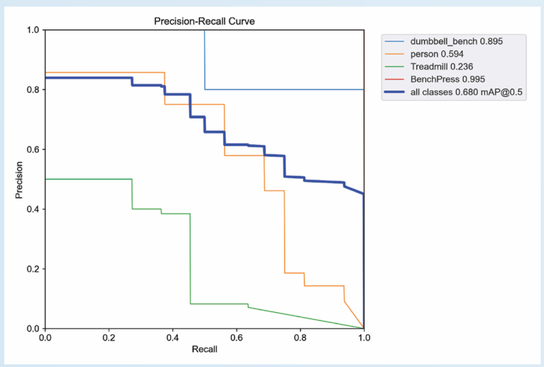
- Accurate detection in various lighting conditions/angles
- Distinguishing occupied and unoccupied states with minimal false positives
- Consistent functionality amidst background noise and other gym-goers
- Managing real-time video processing and database updates efficiently

System Design



Results





- Trained YOLOv5 motion tracking model
- Developed functional prototype that updates app in real-time
- Achieved initial ~80% accuracy rate in detection
- Seamless database transaction and web integration

Future Steps

- Expand detection capability to other areas of the gym
- Improve AI accuracy through additional traning and edge-case handling
- Implement a mobile app for convenience
- Integrate frequency-of-usage analytics panel for admins/owners